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10/695,327	10/27/2003	Yin-Chun Huang	9585-0439	4865

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/695,327	HUANG ET AL.	
	Examiner	**Art Unit**	
	Quang N. Vo	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-13 and 18-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-13 and 18-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Regarding claim 1, Applicant's argument is Hajjahmad fails to disclose restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern.

In response: Hajjahmad discloses restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern (e.g., the results of the parallel color recovery for each channel are combined in block 416 so that each color component is represented at each pixel location and the output image drawn from the processed pixels will exhibit full color resolution, column 10, lines 22-39).

Hajjahmad does not explicitly disclose decreasing the full color level of the color element by reducing a number of bits of the full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image.

Maurer discloses decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image (e.g., the luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51. Note: the bit depth truncated may be performed in RGB color space with Red, Green, and Blue color component or in YCbCr

color space), wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image (e.g., bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 45-47).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad to include decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image as taught by Maurer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad by the teaching of Maurer to reduce image noise.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In particular, the limitation “wherein **the number**

of bits of the color element decreased from the full image level corresponds to a level of the image noise" is not defined in the specification.

Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the limitation “wherein **the number of bits of the color element** decreased from the full image level corresponds to a level of the image noise" is not defined in the specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6-13, and 18-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hajjahmad et al. (Hajjahmad) (US 5,748,770) in view of Maurer et al. (Maurer) (US 6,650,773).

Regarding claim 1:

Hajjahmad discloses a computer-implemented method (e.g., the invention relates to a system and methods thereto for image color recovery, column 1, lines 21-22, figure 1) comprising: scanning an image with a scanner to obtain a full color level of a color element of a pixel of the scanned image (e.g., FIG. 1 illustrates an electronic image

processing system where an image signal source, such as an electronic still camera 10 or a scanner 12, provides an electronic image signal which represents an image of the subject, column 4, lines 2-6); composing a pattern (e.g., fig. 4 with vertical red, vertical green, vertical blue , horizontal red, horizontal green, horizontal blue. Note: since pattern is consisting of horizontal and vertical color component. Thus the vertical and horizontal of red, green, and blue of fig. 4 represent as pattern) comprising the color element (e.g., red, green, blue, figure 4), wherein the pattern has less color level of the color element than the full color level (e.g., from step 404 to step 414, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern; and since the recovery color components red, green, and blue combine for output image with full resolution, column 10, lines 35-39. Thus pattern must have less color level than the full color level); and restoring the full color level of the color element of the pixel by combining the reduced color level image with the pattern (e.g., the results of the parallel color recovery for each channel are combined in block 416 so that each color component is represented at each pixel location and the output image drawn from the processed pixels will exhibit full color resolution, column 10, lines 22-39).

Hajjahmad does not explicitly disclose decreasing the full color level of the color element by reducing a number of bits of the full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image.

Maurer discloses decreasing the color level of the color element by reducing a

number of bits of a full color level of the color element to form a reduced color level image (e.g., the luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51. Note: the bit depth truncated may be performed in RGB color space with Red, Green, and Blue color component or in YCbCr color space), wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image (e.g., bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 45-47).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad to include decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image, wherein the number of bits reduced from the full color level corresponds to an image noise level associated with scanning the image as taught by Maurer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad by the teaching of Maurer to reduce image noise.

With regard to claim 2, Maurer discloses wherein the reduced color level image and the pattern are combined using a bit enhanced method (e.g., bit-depth truncation, block 106, column 2, lines 44-48. Note: examiner interprets that because Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level

where visual artifacts are virtually unnoticeable. Thus bit-depth truncation is a bit enhanced method).

Regarding claim 3, Hajjahmad and Maurer combined disclose wherein combining the reduced color level image (e.g., bit-depth truncation, block 106, column 2, lines 44-48) with the pattern restores the pixel to include a same number of bits of the color element as before the full color level was decreased (e.g., from step 404 to step 414, figure 4, column 10, lines 22-39 and step 416, figure 4).

With regard to claim 4, Hajjahmad discloses wherein the pattern comprises a halftone pattern (e.g., FIG. 3A provides the following example of vertical color recovery followed by horizontal color recovery (i.e. column followed by row) for serial implementation of the third color recovery method listed above. An input image s(j,i) having P rows and Q columns is shown in block 300, where i is the row index and j is the column index, column 9, lines 62-65).

Regarding claim 6, Hajjahmad discloses a computer implemented method for reducing image noise in a scanned image (e.g., FIG. 1 illustrates an electronic image processing system where an image signal source, such as an electronic still camera 10 or a scanner 12, provides an electronic image signal which represents an image of the subject (not shown). A computer 18 receives the electronic signal from the image signal source and thereafter processes the image signal electronically to provide any number of known image processing functions such as resizing, sharpening, noise removal, column 4, lines 2-10), comprising:

scanning the image with a scanner to obtain a gray scale of one or more pixels of the

image (e.g., FIG. 1 illustrates an electronic image processing system where an image signal source, such as an electronic still camera 10 or a scanner 12, provides an electronic image signal which represents an image of the subject, column 4, lines 2-6); restoring the gray scale of the one or more pixels using a halftone pattern comprising a matrix, and wherein a number of rows and a number of columns of the matrix correspond to the number of bits of gray scale image data subtracted from the one or more pixels (e.g., from step 404 to step 416, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern. Note: since Hajjahmad discloses restoring the gray scale of the one or more pixels using a halftone pattern comprising a matrix. it would have been obvious to one of ordinary skill in the art that to restore and obtain a full level of color image, Hajjahmad must use pattern with row and column equal to number of bits reduced to have full level of color).

Hajjahmad does not explicitly disclose reducing the gray scale of the one or more pixels of the image by reducing a number of bits of gray scale image data from each of the one or more pixels.

Maurer discloses reducing the gray scale of the one or more pixels of the image by reducing a number of bits of gray scale image data from each of the one or more pixels (e.g., the luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51. Note: the bit depth truncated may be performed in RGB color space with Red, Green, and Blue color component or in YCbCr

color space), wherein the number of bits of gray scale image data reduced from the one or more pixels corresponds to an image noise level associated with scanning the image (e.g., bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 45-47).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad to include reducing the gray scale of the one or more pixels of the image by reducing a number of bits of gray scale image data from each of the one or more pixels, wherein the number of bits of gray scale image data reduced from the one or more pixels corresponds to an image noise level associated with scanning the image as taught by Maurer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad by the teaching of Maurer to reduce image noise.

With regard to claim 7, Maurer differs from claim 7, in that he does not explicitly teach the color level of the pattern depends on the number of bits reduced from the full color level.

Maurer discloses in general, the luminance channel has the bit depth may be truncated down about 2 bits (column 2, lines 44-51); and each chrominance channel may be down-sampling by factor of 2 by replacing 2x2 matrix of pixels by a single pixel (column 2, lines 60-64); and since color is combined of chrominance channel and luminance channel. Thus number of bits reduced can set equal to the size of the pattern (e.g., 2x2 matrix).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have recognized Maurer is having teaching the color level of the pattern depends on the number of bits reduced from the full color level, or at least obvious to provide functional part for performing the color level of the pattern depends on the number of bits reduced from the full color level.

Regarding claim 8, Hajjahmad discloses a computer implemented method for reducing image noise in a scanned image (e.g., FIG. 1 illustrates an electronic image processing system where an image signal source, such as an electronic still camera 10 or a scanner 12, provides an electronic image signal which represents an image of the subject (not shown). A computer 18 receives the electronic signal from the image signal source and thereafter processes the image signal electronically to provide any number of known image processing functions such as resizing, sharpening, noise removal, column 4, lines 2-10), comprising: scanning with a scanner to obtain a color level of a color element of a pixel of the scanned image (e.g., FIG. 1 illustrates an electronic image processing system where an image signal source, such as an electronic still camera 10 or a scanner 12, provides an electronic image signal which represents an image of the subject, column 4, lines 2-6); composing a halftone pattern comprising a reduced image level of the color element corresponding to the decreased number of bits; and restoring an image level of the color element of the pixel using the halftone pattern (e.g., from step 404 to step 416, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern. Note: since Hajjahmad discloses restoring the color level of the one or more pixels using a halftone

pattern comprising a matrix. it would have been obvious to one of ordinary skill in the art that to restore and obtain a full level of color image, Hajjahmad must use pattern with row and column equal to number of bits reduced to have full level of color).

Hajjahmad does not explicitly disclose reducing the full image level of the color element by decreasing a number of bits of the color element according to the image noise associated with scanning the image.

Maurer discloses decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image associated with scanning the image (e.g., the luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51. Note: the bit depth truncated may be performed in RGB color space with Red, Green, and Blue color component or in YCbCr color space; documents scanned from newspapers, journals, etc., column 2, lines 20-21).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad to include decreasing the color level of the color element by reducing a number of bits of a full color level of the color element to form a reduced color level image as taught by Maurer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad by the teaching of Maurer to reduce image noise.

With regard to claim 9, Hajjahmad discloses wherein a number of bits of the color element in the recombined image level is the same as a number of bits of the color element in the full image level (e.g., from step 404 to step 416, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern. Note: since Hajjahmad discloses restoring the gray scale of the one or more pixels using a halftone pattern comprising a matrix. it would have been obvious to one of ordinary skill in the art that to restore and obtain a full level of color image, Hajjahmad must use pattern with row and column equal to number of bits reduced to have full level of color).

With regard to claim 10, Hajjahmad discloses wherein the halftone pattern comprises a matrix having a number of rows equal to the decreased number of bits (e.g., from step 404 to step 416, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern. Note: since Hajjahmad discloses restoring the gray scale of the one or more pixels using a halftone pattern comprising a matrix. it would have been obvious to one of ordinary skill in the art that to restore and obtain a full level of color image, Hajjahmad must use pattern with row and column equal to number of bits reduced to have full level of color).

With regard to claim 11, Hajjahmad discloses wherein the halftone pattern comprises a matrix having a number of columns equal to the decreased number of bits (e.g., from step 404 to step 416, figure 4, column 10, lines 22-39. Note: recovery color level by row and column representing array/halftone pattern. Note: since Hajjahmad discloses restoring the gray scale of the one or more pixels using a halftone pattern

comprising a matrix. it would have been obvious to one of ordinary skill in the art that to restore and obtain a full level of color image, Hajjahmad must use pattern with row and column equal to number of bits reduced to have full level of color).

With regard to claim 12, Maurer discloses further comprising displaying the image including the recombined image level on a computer monitor (e.g., block 160, figure 2).

With regard to claim 13, Maurer discloses further comprising filling out missing codes of the pixel using a bit-enhanced method (e.g., the interpolation may be performed by pixel replication, column 3, lines 47-51).

<u>Referring to claim 18:</u>

Claim 18 is the apparatus claim corresponding with method steps in claim 8. Therefore claim 18 is rejected as set forth above for claim 8.

<u>Referring to claim 19:</u>

Claim 19 is the apparatus claim corresponding with method steps in claim 9. Therefore claim 19 is rejected as set forth above for claim 9.

With regard to claim 20, the subject matter is similar to claims 10 and 11. Therefore claim 20 is rejected as set forth above for claims 10 and 11.

Regarding claim 21, Hajjahmad discloses wherein the image level is recombined with the halftone pattern to restore the color element of the one or more pixels to the full image level (e.g., the results of the parallel color recovery for each channel are combined in block 416 so that each color component is represented at each pixel

location and the output image drawn from the processed pixels will exhibit full color resolution, column 10, lines 22-39).

Regarding claim 22, Maurer discloses wherein the number of bits decreased from the full image level approximates a level of the image noise (e.g., Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51).

With regard to claim 23, the subject matter is similar to claim 7. Therefore claim 23 is rejected as set forth above for claim 7.

With regard to claim 24, Maurer discloses wherein one or more of the full image level, the reduced image level, and the image level comprise a color level (e.g., the digital image is made up of a plurality of pixels, each pixel being represented by an n-bit word. In a typical 24-bit word representing RGB color space, for instance, eight bits represent a red component, eight bits represent a green component and eight bits represent a blue component, column 2, lines 7-14. Note: examiner interprets that each color component has 8 bits and the combination of color components to represent a full image level, and the reduced image level.).

Regarding claim 25, Maurer discloses wherein one or more of the full image level, the reduced image level, and the image level comprise a gray level (e.g., the digital image is made up of a plurality of pixels, each pixel being represented by an n-bit word. In a typical 24-bit word representing RGB color space, for instance, eight bits represent a red component, eight bits represent a green component and eight bits

represent a blue component, column 2, lines 7-14. Note: examiner interprets that each color component has 8 bits, which has 255 gray scale for each color component).

Regarding claim 26, Hajjahmad discloses wherein the scanned image comprises three color elements, and wherein the pixel comprises at least one of the three color elements (e.g., Red, green, and blue in RGB color space, figure 4).

Regarding claim 27, Hajjahmad discloses wherein the three color elements comprise a red color element, a blue color element, and a green color element (e.g., Red, green, and blue in RGB color space, figure 4).

Regarding claim 28, Maurer discloses wherein the full image level of the color element and the recombined image level of the color element comprises a gray level (e.g., luminance channel, column 2, line 44).

Regarding 29, Maurer discloses wherein the full image level is reduced by decreasing a number of bits of the gray level (e.g., The luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 44-47).

Regarding claim 30, Hajjahmad does not disclose wherein the number of bits of the color element decreased from the full image level corresponds to a level of the image noise.

Maurer discloses wherein the number of bits of the color element decreased from the full image level corresponds to a level of the image noise (e.g., Bit-depth of the

luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 44-51).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad to include wherein the number of bits of the color element decreased from the full image level corresponds to a level of the image noise as taught by Maurer. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Hajjahmad by the teaching of Maurer to reduce image noise.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang N. Vo whose telephone number is (571)270-1121. The examiner can normally be reached on 7:30AM-5:00PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on (571)272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quang N Vo/
Examiner, Art Unit 2625

/David K Moore/
Supervisory Patent Examiner, Art Unit 2625